

**WE CLAIM:**

1. A method for radiolabeling precursor chemical compounds comprising the steps of:
  - 5 - injecting a sample comprising a precursor chemical compound, into an injection loop of a high performance liquid chromatograph (HPLC);
  - injecting a radiolabeling reagent into the injection loop;
  - allowing the radiolabeling reagent to react with the precursor chemical compound, to provide a reaction mixture comprising a radiolabeled compound;
  - 10 - injecting the reaction mixture into the HPLC column; and
  - isolating the radiolabeled compound.
2. The method according to claim 1, wherein the radiolabeling reagent is  
15 a volatile and condensable compound.
3. The method according to claim 2, wherein the radiolabeling reagent is selected from the group consisting of [ $^{11}\text{C}$ ]-ethyl iodide, [ $^{11}\text{C}$ ]-propyl iodide, [ $^{11}\text{C}$ ]-methyl iodide and [ $^{11}\text{C}$ ]-acetyl iodide.  
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4. The method according to claim 3, wherein the radiolabeling reagent is [ $^{11}\text{C}$ ]-methyl iodide.
5. The method according to claim 1, wherein the precursor chemical  
25 compound is in the form of an acid salt and the sample further comprises a base.
6. The method according to claim 4, wherein the [ $^{11}\text{C}$ ]-iodomethane is reacted with the precursor chemical compound for about 0.5 to about  
30 20 minutes.
7. The method according to a claim 1, wherein the precursor chemical

compound is dissolved in a solvent.

8. The method according to claim 1, wherein the sample further comprises a catalyst.

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9. A radiolabeled compound prepared using a method according to claim 1.

10. A [ $^{11}\text{C}$ ]-methylated compound prepared using a method according to claim 4.

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